Culture of Juvenile and Adult Shrimp

At the beginning of the fiscal year, we were testing four methods of growing shrimp in our ponds. In each of four 0.02-hectare (1/20-acre) ponds, immature brown shrimp had been stocked at a density of one shrimp per 0.2 m.^{2} (2 ft.^{2}) of bottom surface. This year we stocked juvenile rather than postlarval shrimp so that we could concentrate our efforts on determining how to offset the slow growth (past studies) experienced when shrimp in ponds became 76 to 100 mm. (about 3 - 4 inches) long. Table 3 summarizes the treatment and results in each pond.

Feeding rates throughout the 114-day study were based on initial stocking density, but it was apparent at harvest that we had supplied too much food. Loss of nutrients from the excess food apparently supported dense growth of algae in both ponds. Temperatures reached 34° C. (93° F.), and pH values rose above 9 several times in the study. To prevent oxygen levels from dropping below 2 ml. per liter, we aerated each pond with a low-pressure, high-volume air pump. This technique did maintain oxygen levels above 2 ml. per liter in pond 2, but the shrimp suffered extensive mortality due to some other factor or combination of factors.

At the time of harvest, we recovered 14 white shrimp with the brown shrimp from pond 4. Although they were the same size as the brown shrimp when stocked, their average size at harvest was 23 per pound as compared to 55 per pound for brown shrimp.

Shrimp retained from the feeding studies were restocked in our ponds and examined periodically in the fall and winter for signs of sexual development. Males in two ponds had signs of advanced maturation. Spermatophores were visible as whitish bodies beneath the lower posterior edge of the carapace (fig. 4). Several females had mated, but only a few had developing ovaries. Sexual development was arrested by the approach of winter and the accompanying low water temperatures. At that time we removed a number of the largest shrimp from the ponds and placed them indoors in a 9,000-liter (2,400-gallon) tank in which the temperature was maintained at 27° C. (81° F.) and salinity at 33 p.p.t. These shrimp failed to show any signs of maturity over a 4-month period.

This spring we continued to try to bring shrimp into spawning condition in a controlled environment. Adult shrimp, placed in each of four ponds and in seven large fiberglass tanks in the laboratory, are fed different diets and observed closely for sexual development. To date, only pond-reared males show signs of becoming mature.

Since the construction of our first ponds, one of our major problems has been to stabilize

Table 3.--Summary of results obtained from experimental rearing of shrimp in four brackish-water ponds at Galveston, Tex., 1968

Pond number	Treatment	Size at stocking	Size at harvest	Average individual gain		Survival	Total food added		Total weight gained or lost	
		Number per pound		Grams	Ounces	Percent	Kilograms	Pounds	Kilograms	Pounds
1	No food or fertilizer.	59	52	1.0	0.03	82	0	0	-0.6	-1.3
2	Fed 5 percent of body weight daily. Trout food 50 percent; rabbit food 50 percent.	33	21	8.0	.28	22	58.7	129.5	-6.7	-14.8
3	Fed 5 percent of body weight daily. Trout food 100 percent; fertilized once[1].	62	34	6.1	.22	68	31.1	68.6	3.5	7.8
4	Fertilized[1] once.	70	55	1.8	.06	60	0	0	-.6	-1.4

[1] N:P:K = 10:40:10

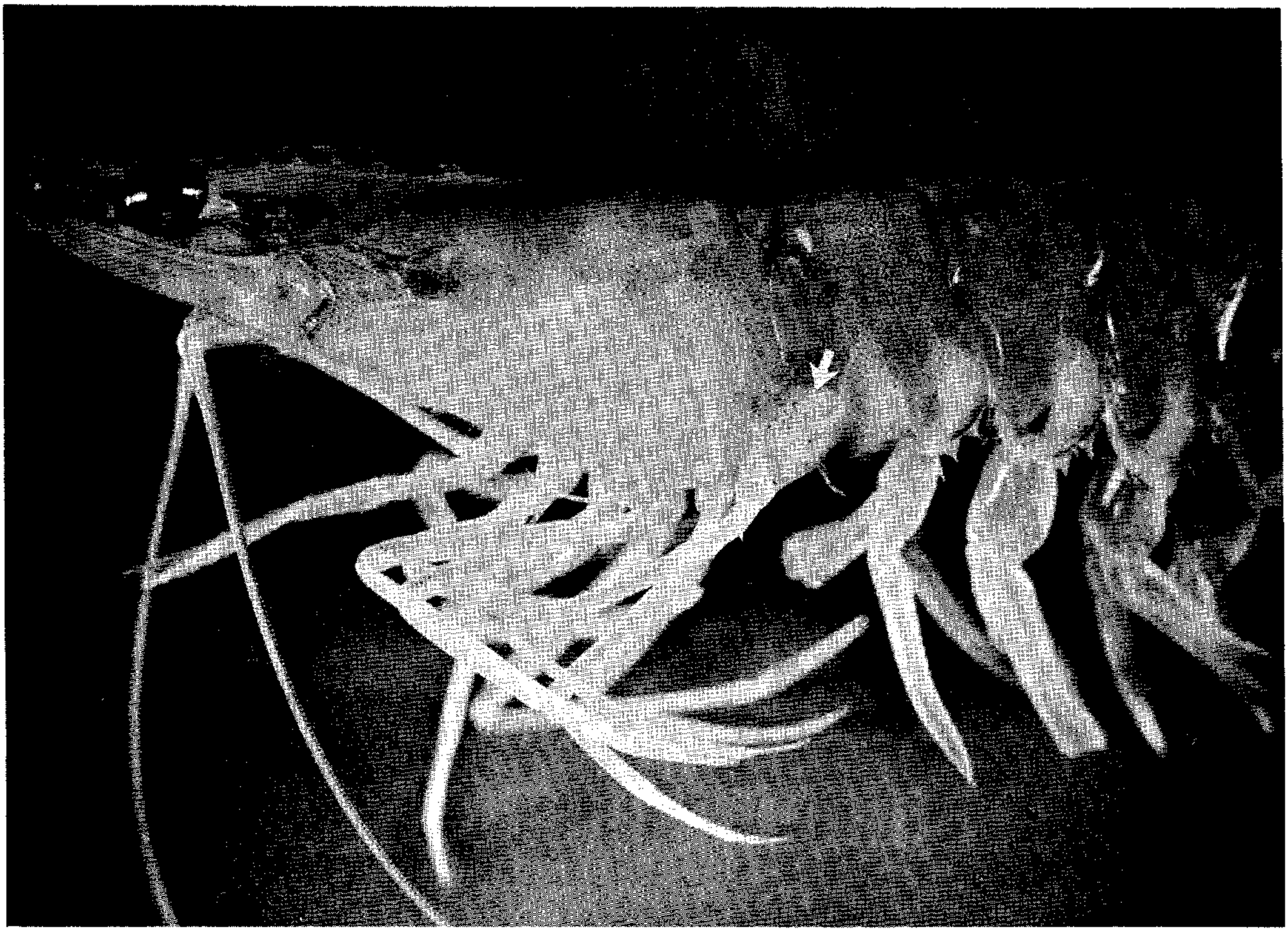

Figure 4.--The presence of a spermatophore (white arrow) in a male brown shrimp reared in a pond indicates approaching sexual maturity.

the banks and levees. By the first of February, we had transplanted successfully salt marsh-grass, Spartina alterniflora; rush marsh-grass, S. patens; and salt-grass, Distichlis spicata, on several banks and levees. On February 14, tides about 1 m. (3 ft.) above mean water flooded our ponds. Our experimental shrimp were lost, and banks and levees not protected by marsh-grass were damaged extensively (fig. 5). Our bank stabilization work continued this summer.

Ray S. Wheeler, Project Leader

Experimental Seeding

To develop and refine techniques for experimental seeding of shrimp in Florida Bay, we reared pink shrimp in the laboratory from the egg to juvenile stage.

We caught gravid female pink shrimp on the Tortugas grounds and transported them to TABL in Miami. Several shrimp spawned, and the viable eggs developed in a 1,890-liter (500-gallon) tank. Following techniques devised at the Biological Laboratory, Galveston, we reared about 26,000 pink shrimp postlarvae; however, we cancelled our plans to place this group of postlarvae in a selected seeding site in northeast Florida Bay.

Some of the 26,000 postlarvae were preserved for study, whereas others perished because of crowded conditions in the rearing tanks as the size of the shrimp increased. We gave Florida State University one group of about 6,000 postlarvae for use in nutrition studies by graduate students. These shrimp were transported by automobile to Tallahassee where they arrived in good condition. An additional 3,000 to 4,000 postlarvae, 7 to 15 mm. (0.3 - 0.6 inch) long, were placed in a seawater reservoir tank at the TABL on September 9, 1968. They survived well on the natural food growing in the tank or entering the tank with the incoming water. We sampled these shrimp on December 3, 1968; they were 36 to 69 mm. (1.4 - 2.7 inches) long.

In August 1968, after 32 months of sampling, we stopped taking quantitative samples of planktonic postlarval shrimp (mostly pink shrimp) entering Florida Bay via Whale Harbor Channel (Islamorada, Fla.). Analysis of past